

America's success shows the wisdom of public policies that encourage private sector investment, competition, and technological innovation. But the government also has a special obligation to ensure that all Americans, including Americans living in rural communities, have the opportunity to be full participants in the Information Age. NTIA and RUS recommend the following steps be taken to expand access to broadband networks in rural America:

1. Increase support for programs that will expand broadband infrastructure and innovative applications of information and communications technologies in rural America

This year, President Clinton and Vice President Gore have proposed new programs and increases in several existing programs that will help expand access to information technology and broadband telecommunications services for rural communities, including:

- An increase in NTIA's Technology Opportunities Program (TOP) from \$15 million to \$45 million and the creation of a new \$50 million grant program to expand home access for low income families. Approximately 65% of NTIA's TOP grants serve rural communities, and the new home access program may help to assist families in rural areas.
- An increase in the Department of Education's Community Technology Center program from \$32.5 million to \$100 million. This will enable the creation or expansion of up to 1,000 Community Technology Centers.
- The creation of a new pilot program at the Rural Utilities Service that could provide up to \$100 million in loan guarantees for rural broadband services and continued support for the RUS Telecommunications infrastructure loan program.
- An increase in the RUS Distance Learning and Telemedicine Loan and Grant Program from \$20 million in grants and \$200 million in loans to \$25 million in grants and \$300 million in loans.

The maintenance and expansion of these programs, among others, are necessary to closing the broadband divide between urban and rural areas in America.

2. Adopt an evolving definition of "universal service" that will support advanced services in all regions of the nation

The Telecommunications Act of 1996 states that "access to advanced telecommunications and information services should be provided in all regions of the Nation," and that customers in rural and high-cost areas should have access to advanced services at rates that are "reasonably comparable" to rates in urban areas. Under the Act, the Federal-State Joint Board on Universal Service and the Federal Communications Commission are charged with updating the definition of universal service to reflect the evolving nature of telecommunications services.

In the context of current supported services, NTIA and RUS commend the Commission's reexamination of the definition of voice grade access.¹²⁰ Because voice grade service in rural

120. See Public Notice on Voice Grade Access, *supra* note 100. The Commission originally selected a voice grade bandwidth of 3,500 Hz (500 to 4,000 Hz), which would generally support modem operation at 28 kilobits/second.

areas is the primary path to the Internet, and is likely to remain so in the near term, it is especially important that universal service support promote voice service that is comparable both in bandwidth and data rate to that available to the vast majority of Americans. For that reason, the Administration has supported both a voice grade bandwidth of 300 to 3,400 Hz and a data rate of at least 28.8 kilobits/second.¹²¹

In light of the rapid changes in telecommunications services, NTIA and RUS urge that, during the next periodic review of the definition of supported services, the Federal-State Joint Board and the Commission make it a priority to adopt a definition that will advance the widespread and timely deployment of advanced services to all regions of the country.

3. Consider universal service funding mechanisms to fulfill the Act's mandate

The Telecommunications Act of 1996 requires the FCC to base policies of universal service on the principle that consumers in rural areas should have access to advanced services that are reasonably comparable to services in urban areas, and that there should be specific, predictable and sufficient support mechanisms to advance universal service.¹²² NTIA and RUS recommend that the Commission make it a priority to fashion a comprehensive high-cost program, by identifying all necessary support mechanisms, to achieve the statutory goal established four years ago.¹²³ Pending its ultimate decision on high-cost reform, the Commission should also consider measures that eliminate barriers to infrastructure investment. Among other things, the Commission should consider the need to adjust the existing cap on the universal service fund, particularly with respect to exchanges sold to a rural carrier from a non-rural carrier.¹²⁴ Further, attention should be given to the needs of unserved areas, especially tribal communities.¹²⁵

See May 8 Order, *supra* note 5. Later, on its own motion, the FCC reduced the supported bandwidth to 2,700 Hz (300 to 3,000 Hz), a bandwidth that cannot reliably support modem operation at 28 kilobits/second. See *Fourth Order on Reconsideration*, CC Docket No. 96-4, *Report and Order* in CC Docket Nos. 96-45, 96-262, 94-1, 91-213, 95-72, FCC 97-420 (rel. Dec. 30, 1997). The Commission is now reviewing its more recent definition.

121. See Comments and Ex Parte Comments of the Rural Utilities Service, *Common Carrier Bureau Seeks Comment on Requests to Redefine "Voice Grade Access" for Purposes of Federal Universal Service Support*, CC Docket No. 96-45 (filed Jan. 19, 2000 and April 11, 2000, respectively). (www.usda.gov/rus/unisrv). See also *supra* note 103 and accompanying text.

122. See 47 U.S.C. § 254(b)(3), (5)(Supp. III 1997).

123. The Commission has taken steps to provide universal service support to high-cost areas served by larger telecommunications carriers. Reform of the high-cost program for areas served by rural telephone companies will be considered by the Joint Board.

124. See Comments of Rural Utilities Service, *Federal-State Joint Board on Universal Service: Promoting Deployment and Subscribership in Unserved and Underserved Areas, Including Tribal and Insular Areas*, Further Notice of Proposed Rulemaking, CC Docket No. 96-45, 14 FCC Rcd 2117 (filed Dec. 17, 1999) (www.usda.gov/rus/unisrv/12-17com.htm).

125. *Id.* See also Ex Parte Comments of the National Telecommunications and Information Administration (filed April 14, 2000) in the same proceeding.

4. Reform RUS lending policies to stimulate private sector investment in broadband services

Under current regulations, RUS can lend to service providers only if, at a minimum, they meet the "basic local exchange telephone service needs of rural areas," *i.e.*, provide wireline voice service.¹²⁶ This prevents RUS from lending to providers that want to offer, for example, advanced telecommunications services without offering voice. Given Administration and Congressional interest in promoting the availability of broadband, RUS is proposing regulatory reforms to change these policies. This would allow RUS to use more of its \$670 million in lending authority for rural telecommunications to encourage private sector investment in rural broadband services. RUS has already proposed a rule that will allow financing of mobile telecommunications providers who do not offer wireline voice service in their wireless area.¹²⁷

5. Ensure continued support for the E-rate

The E-rate provides up to \$2.25 billion in discounts to connect schools and libraries to the Internet. In certain cases, the E-rate program has brought broadband connections to rural areas and small non-rural towns and catalyzed market demand for those services. Continued support and funding for this program is particularly important for rural communities, which often face higher prices for advanced telecommunications services.

6. Publicize recent changes in rural health care discount program

In 1999, the FCC adopted reforms in the rural health care discount program that make it easier for rural health care providers to purchase advanced telecommunications services for telemedicine and other health care applications. NTIA and RUS will publicize these changes so that more rural health care providers are aware of these improvements to the program.

7. Collect and disseminate "promising practices" for accelerating private sector investment in rural broadband services

Communities around the country are experimenting with new models and new forms of public-private partnerships to promote private sector investment in advanced telecommunications services. Programs, such as the "Berkshire Connect" initiative to aggregate demand in rural areas, are helping attract the private sector investment needed to provide advanced services. NTIA and RUS are committed to collecting and disseminating these kinds of promising practices, using mechanisms such as the "Digital Divide" web site (www.digitaldivide.gov).

8. Increase research to discover "last mile" solutions for rural America

The Administration has proposed significant increases in federal funding for information and communications research and development (R&D), an initiative known as "Information Technology for the Twenty-First Century." This initiative follows the recommendations of the

126. See 7 CFR 1735.14 (c)

127. See Proposed Rule 7 CFR 1735, 65 Fed. Reg. 6922 (Feb. 11, 2000).

President's Information Technology Advisory Committee (PITAC), which concluded that industry was unlikely to make investments in long-term, high-risk research. The recommendations of the PITAC enjoy strong bipartisan support, and legislation that would authorize much of the Administration's initiative (Networking and Information Technology Research and Development Act) recently passed the House.

As part of this initiative, the Administration is committed to increasing investment in R&D to address the unique "last mile" challenges of rural America. As noted in this report, the current generation of broadband technologies (satellite, wireline, fixed and mobile wireless) have shortcomings that can limit their deployment in rural areas. Agencies such as NTIA and the National Science Foundation (NSF) will increase their support of research that could result in next generation broadband technologies for rural America. The Administration has called for a budget increase for NTIA's Institute for Telecommunications Sciences to provide broadband technology research, standards development, and policy support vital to the successful commercialization and widespread deployment of broadband capabilities, particularly in rural and disadvantaged areas. Since NSF supports university-based research, this initiative will also increase the supply of undergraduate and graduate students in technical fields with insights into the challenges of providing broadband telecommunications to rural areas.

Table Data Performance Comparison¹

Technology ²	Downstream Typical (Max) Kb/sec	Upstream Typical (Max) Kb/sec	Range (Miles) ³	Availability	Deployment	Typical Use	
						Business	Personal
Cellular/PCS dial up	9.6 (20)	9.6 (20)	10	Recent	1 000s	✓	✓
V34 Modem-dialup	28 (34)	28 (34)	3.5	Common	35-40 million		✓
V90 Modem-dialup	45 (53)	28 (34)	2.5	Common.	millions		✓
Basic Rate ISDN-dialup	128	128	10	Common	100,000s	✓	
DBS Satellite	350 (400)	through phone	NA	Nearly Universal	10,000s		✓
MultiChan. Multipoint Dist.System	100s (1,000s)	100s (1,000s)	35	Recent	10,000s	✓	✓
Prospective Satellite Systems	100s (1,000s)	100s (1,000s)	NA	Under Development	None	✓	✓
3 rd Generation Cellular	100s (2,000)	100s (1,000s)	10	Under Development	None	✓	✓
Primary Rate ISDN-dialup	1,544	1,544	2.4	Rare	1000s	✓	
T1	1,544	1,544	1.1	Common	10,000s	✓	
G.lite DSL	400 (1,500)	64-256 (500)	3.5	Recent	~½ million	✓	✓
Cable TV Modem	>1,000 (27,000 ⁴)	200 (10,000 ⁴)	3	Recent	~1.5 million		✓
Local Multipoint Dist. System	(155,000)	(155,000)	4	Recent	1,000s	✓	
Fiber to the Home	millions	millions	100s	Recent	1,000s	✓	✓

1. This table was compiled by NTIA and RUS from publicly available information. Most of the services delivered by these technologies are available at several bit rates. Performance of each technology varies with the nature of the communication medium. Also, some of the services operate at varying rates. This makes a simple comparison difficult. Most of the numbers provided here are representative, not exact. They are meant to place the capabilities of these technologies in context.

2. Wireless technologies are shaded.

3. Maximum range from electronic interface or antenna for typical downstream/upstream performance. Wireless requires line of sight.

4. Shared among users and seldom available to a single user.

APPENDIX A: CABLE MODEM DEPLOYMENT
Availability of Cable Modem Service in the United States

Appendix A is a compilation of areas where cable modem service is offered to at least part of the city or area. In most cases, cable modem service is added a neighborhood at a time as the system is upgraded.

Sources: Provider information is from *Cable Modem Deployment Update*, Communications, Engineering and Design (CED) Magazine, March 2000 (www.cedmagazine.com). The population data are from the U.S. Census Bureau's 1990 Census Gazetteer, (www.census.gov/cgi-bin/gazetteer).

Area and Provider	Population
AT&T Broadband & Internet Services	
Alameda, CA	76,459
Albany/Corvallis City, OR	74,219
Allen, TX	18,309
Alton, IL	32,905
Antioch, CA	62,195
Arlington Heights, IL	75,460
Arvada, CO	89,235
Auburn, AL	33,830
Aurora/Lowery, CO	222,103
Baden/Monessen/Ross Township, PA	48,457
Baton Rouge, LA	219,531
Battle Creek, MI	53,540
Beaverton, OR	53,310
Berlin, CT	Not Available
Birmingham, AL	265,968
Boise City/Nampa/Caldwell, ID	172,503
Bremerton, WA	38,142
Bristol, CT	60,640
Carnegie/McDonald, PA	13,782
Castle Shannon, PA	9,135
Castro Valley, CA	48,619
Cedar Falls/Waterloo, IA	100,765
Cedar Rapids, IA	108,751
Chicago/Chicago suburbs, IL	2,783,726*
Clinton, IA	29,201
Colleyville, TX	12,724
Columbia, MO	69,101
Columbus, GA	178,681
Corliss, PA	Not Available
Cupertino, CA	40,263
Dallas, TX	1,006,877
DeSoto/Cedar Hill, TX	50,520
Decatur, IL	83,885
Denham Springs LA	8,381
Des Moines, IA	193,187
Des Plaines, IL	53,233
Dublin, CA	23,229

Area and Provider	Population
AT&T Broadband & Internet Services	
Dubuque, IA	57,546
East Lansing, MI.	50,677
Edgewater, CO	4,613
Enumclaw, WA	7,227
Eugene, OR	112,669
Eufless, TX	38,149
Farmers Branch, TX	24,250
Ferndale, WA	5,398
Flower Mound, TX	15,527
Fort Collins, CO	87,758
Foster City/Hillsborough, CA	38,843
Fremont, CA	173,339
Frisco, TX	6,141
Galesburg, IL	33,530
Garland, TX	180,650
Golden, CO	13,116
Grand Junction, CO	29,034
Grand Prairie, TX	99,616
Grand Rapids, MI	189,126
Greeley, CO	60,536
Greensburg, PA	16,318
Griffith, IL	Not Available
Hartford, CT	139,739
Harvey/South Holland, IL	51,876
Hayward, CA.	111,498
Hercules, CA	16,829
Highland Park, IL	30,575
Hueytown/Tarrant, AL	23,326
Iowa City, IA	59,738
Iowa City, TX	Not Available
Lakewood, CO	126,481
Lancaster/Hutchins, TX	24,836
Lewiston, ID	28,082
Livermore, CA	56,741
Lynden, WA	5,709
Marin County, CA	230,096
McKees Rocks, PA	7,691
McKeesport, PA	26,016
McKinney, TX	21,283
Mercer Island, WA	20,816
Mesquite, TX	101,484
Milpitas/Santa Clara, CA	101,967
Moline, IA	Not Available
Mon Valley/Donora, PA	Not Available
Montgomery, AL	187,106
Mount Prospect, IL	53,170

Area and Provider	Population
AT&T Broadband & Internet Services	
Muscatine, IA	22,881
Muskegon, MI	40,283
Nashville-Davidson, TN	488,374
New Britain/Plainville, CT	Not Available
Oak Lawn, IL	56,182
Ogden, UT	63,909
Olympia, WA	33,840
Overland/St. Ann/Alton, MO	33,168
Park Ridge, IL	36,175
Penn Hills/East Hills, IL	Not Available
Peoria, IL	113,504
Peru, IL	9,302
Petaluma, CA	43,184
Pinole, CA	17,460
Pittsburg, CA	47,564
Pittsburgh/Aliquippa, PA	383,253
Plano, TX	128,713
Pleasanton, CA	50,553
Portland, OR	437,319
Pueblo, CO	98,640
Richardson, TX	74,840
Richmond, CA	87,425
Rochester, MI	7,130
Rock Island, IL	40,552
Royal Oak, MI	65,410
St. Charles/O'Fallon, MO	73,253
Salem, OR	107,786
Salt Lake City, UT	159,936
Sammamish City, WA	Not Available
San Mateo, CA	85,486
San Ramon, CA	35,303
Santa Clara, CA.	93,613
Schaumburg, IL	68,586
Seattle, IL	Not Available
Seattle, WA	516,259
Simsbury Center, CT	5,577
Skyway/G'town/White Cntr-Shorewood, WA	Not Available
South San Francisco, CA	54,312
Spokane, WA	177,196
Springfield, MO	140,494
State College/Castle Shannon, PA	48,058
Steubenville, OH	22,125
Stonebridge, TX	Not Available
Streamwood, IL	30,987
Sunnyvale, CA	117,229

Area and Provider	Population
AT&T Broadband & Internet Services	
Tacoma, WA	176,664
Tulsa, OK	367,302
Valparaiso, IN	24,414
Vancouver, WA	46,380
Walled Lake, MI	6,278
Watertown, SC	Not Available
Waukegan, IL	69,392
Wheat Ridge/Lakewood, CO	155,900
Woodhaven, MI	11,631
Adelphia	
Adams, MA	6,356
Bethel Park/W. Mifflin/Plymouth Meeting, PA	63,708
Blacksburg, VA	34,590
Buffalo, NY	328,123
Burlington, VT	Not Available
Canaan, OH	Not Available
Charlottesville, VA	40,341
Coudersport, PA	2,854
Delray Beach, FL	47,181
Grand Island, NY	Not Available
Hilton Head Island, SC	23,694
Lansdale, PA	16,362
Liberty/Amelia, OH	Not Available
Macedonia, OH	7,509
Mount Lebanon, PA	33,362
Niagara Falls, NY	61,840
North Adams, MA	16,797
Norwich, NY	7,613
Palm Beach Gardens, FL	22,965
Philadelphia, PA	1585577
Pittsburgh, PA	369,879
Plymouth, MA	7,258
Dade City, FL	5,633
Staunton, VA	24,461
Stuart, FL	11,936
Sturgis, KY	2,184
Toms River, NJ	7,524
Tonawanda, NY	17,284
Waynesboro, VA	18,549
Wellington, FL	20,670
West Boca, FL	Not Available
West Palm Beach, FL	67,643
Western Reserve, OH	Not Available
Winchester, VA	21,947

Area and Provider	Population
Advanced Cable Communications	
Coral Springs, FL	79,443
Weston, FL	Not Available
Bend Cable	
Bend/Black Butte/Sisters, OR	20,469
Blue Ridge Communications	
Ephrata, PA	12,133
Lehighton/Palmerton, PA	11,308
Mansfield, PA	3,538
Stroudsburg, PA	5,312
Bresnan	
Bay City, MI	38,936
Dickinson County, MI	26,831
Duluth, MN	85,493
Escanaba/Manistique, MI	17,115
Houghton, MI	7,498
Iron Mountain, MI	8,525
Lake Superior, MI	Not Available
Madison, WI	191,262
Mankato, MN	31,477
Marquette, MI	21,977
Marshall, MN	12,023
Midland, MI	38,053
Munising, MI	2,783
Northwoods, MI	Not Available
Rochester, MN	70,745
St. Cloud, MN	48,812
Superior, WI	27,134
Winona, MN	25,399
Bucavision	
Los Angeles, CA	3,485,398
Cable Co-op of Palo Alto	
Palo Alto, CA	55,900
Cable TV of the Kennebunks	
Kennebunk, ME	4,206
CableAmerica	
Maryland Heights, MO	25,407
Waynesville, MO	3,207
CableComm	
Johnstown, PA	28,134
Cablevision Systems	
Fairfield County, CT	827,645
Long Island, NY	Not Available
Cablevision of Lake Havasu	
Lake Havasu, AZ	24,363
Capital Cable	
Boone/Columbia County, MO	181,480

Area and Provider	Population
Central Valley Cable	
Coalinga, GA	Not Available
Charter Communications	
Alhambra, CA	82,106
Albertville/Arab, AL	20,828
Alcoa, TN	6,400
Alexander City, AL	14,917
Alex./Brainerd/La Cross/Park Rapids, MN	Not Available
Altoona, PA	51,881
Anderson, SC	26,184
Asheville, NC	61,607
Athens, GA	45,734
Barre, VT	Not Available
Bedford, VA	6,073
Beloit, WI	35,573
Bloomer, WI	3,085
Boone, NC	12,915
Buies Creek, NC	2,085
Buncombe County, NC	174,821
Burnsville, NC	1,482
Camp LeJeune Central, NC	Not Available
Carrollton, GA	16,029
Charleston, WV	57,287
Charter Commons/Florisant, MO	Not Available
Chicopee, CT	Not Available
Clare, MI	3,021
Cleveland, TN	30,354
Columbia, TN	28,583
Cookeville, TN	21,744
Cornell, WI	1,541
Covington, LA	7,691
Denton, TX	66,270
Douglas, GA	10,464
Dublin, GA	16,312
Eau Claire, WI	56,856
Evansville/Fond Du Lac/Fort Atkinson, WI	51,158
Fenton, MI	8,444
Fort Worth, TX	447,619
Folsom, LA	469
Gaffney, SC	13,145
Gainesville, GA	17,885
Gardendale, AL	9,251
Glendale/Burbank, CA	273,681
Gray Court/Greer, SC	11,236
Greenville/Spartanburg, SC	101,749
Grover City, CA	11,656
Grovetown/Fort Gordon, GA	12,736

Area and Provider	Population
Charter Communications	
Guntersville, GA	Not Available
Gwinnett County, GA	352,910
Hammond/Bogalusa, LA	30,151
Hartselle, AL	10,795
Henry County, GA	58,741
Hickory/Lincolnton, NC	35,148
Highland Park/ University Park, TX	30,998
Janesville/Lake Mills/Lodi/ Mount Horeb/Oregon, WI	67,070
Johnson City, TN	49,381
Johnstown, PA	28,134
Kingsport, TN	36,365
La Grange/Thomaston, GA	34,724
Lafayette/Menomonie, WI	Not Available
Lanett, AL	8,985
Lebanon, TN	15,208
Manchester, GA	4,104
Maryville, IL	2,576
Mazomanie, WI	1,377
Micaville, NC	Not Available
Monterey Park, CA	60,738
Montevallo/Mountain Brook, AL	24,049
Morristown, TN	21,385
Morro Bay/El Paso de Robles, CA	28,247
Mount Pleasant/Thomas, MI	Not Available
Murray, KY	14,439
Newnan, GA	12,497
Newtown, CT	1,800
Northfield, MN	14,684
Olivette, MO	7,573
Onalaska/Tomah, MN	Not Available
Owatonna, MN	19,386
Oxford, MI	2,929
Park Hills, MO	Not Available
Pasadena/Long Beach, CA	561,024
Point Pleasant, WV	4,996
Poynette/Prairie du Sac/ Stevens Point, WI	27,048
Radford, VA	15,940
Redwood, VA	Not Available
Rice Lake, WI	7,998
Riverside, CA	226,505
Rosemount, MN	8,622
Saint Louis, MO	396,685
San Luis Obispo, CA	41,958
Sanford/Whispering Pines, NC	15,718
Sheboygan, WI	49,676

Area and Provider	Population
Charter Communications	
Smyrna, GA	30,981
South Beach, FL	2,754
South County, MO	Not Available
Stockbridge/Jackson, GA	7,435
Taylorsville, NC	1,566
Thomaston, GA	9,127
Turlock, CA	42,198
Union, SC	9,836
Uniontown, PA	12,034
Verona/Waterloo/Watertown/ Whitewater, WI	39,864
Vincennes, IN	19,859
Virginia Complex, TN	Not Available
Wadena/Willmar, MN	21,665
Waterloo, IL	5,072
West Covina/Whittier, CA	173,757
Wisconsin Rapids, WI	18,245
Worcester, MA	169,759
Classic Cable	
Boonville, MO	7,095
Brady, TX	5,946
Cabot, AR	8,319
Fort Scott, KS	8,362
Hugo, OK	5,978
Idabel, OK	6,957
Kermit, TX	6,875
Lampasas, TX	6,382
Lebanon, MO	9,983
Monahans, TX	8,101
Neosho, MO	9,254
Paola, KS	4,698
Poteau, OK	7,210
Rockdale, TX	5,235
Stuttgart, AR	10,420
Terrell, TX	12,490
Trenton, MO	6,129
Woodward, OK	12,340
Crest Communications	
San Mateo, CA	85,486
Coastal Cable	
Amelia/Liberty, OH	Not Available
Comcast	
Alexandria, VA	111,183
Atlanta, GA	394,017
Baltimore, MD	736,014
Bensalem, PA	Not Available

Area and Provider	Population
Comcast	
Castleton, IN	37
Charleston, SC	80,414
Chesterfield, VA	Not Available
Delaware County, PA	547,651
Detroit, MI	1,027,974
Hendricks County, IN	75,717
Indianapolis, IN	731,327
Lawrence, IN	26,763
Marion County, IN	797,159
New Castle County, DE	441,946
Orange County, CA	2,410,556
Philadelphia, PA	1,585,577
Prince William County, VA	215,686
Sarasota, FL	50,961
Speedway, IN	13,092
Union County, NJ	493,819
CommuniComm Services	
Bridgeport, TX	3,581
Chico, TX	800
Decatur, TX	4,252
Durant, OK	12,823
High Springs/Alachua, FL	7,673
Lake Bridgeport, TX	322
Roanoke, AL	6,362
Runaway Bay, TX	700
Westlake/Moss Bluff, LA	13,046
Wheatland/Torrington/Douglas, WY	13,998
Cox Communications	
Amarillo, TX	157,615
Bryan/College Station, TX	107,548
Enid, OK	45,309
Eureka, CA	27,025
Fairfax, VA	19,622
Fredericksburg, VA	19,027
Hampton Roads, VA	Not Available
Hartford/Cheshire Village, CT	145,498
Humboldt Hill, CA	2,865
Lafayette, LA	94,440
Las Vegas, NV	258,295
Mission Viejo, CA	72,820
New Orleans, LA	496,938
Oklahoma City/suburbs, OK	444,719*
Omaha, NE	335,795
Orange County, CA	2,410,556
Phoenix, AZ	983,403
Providence, RI	160,728

Area and Provider	Population
Cox Communications	
San Diego, CA	1,110,549
Santa Barbara, CA	85,571
Wichita, KS	304,011
Echo Cable Management	
Belle Chasse, LA	8,512
Jasper, TX	6,959
Laughlin, NV	4,791
Sour Lake, TX	1,547
Fench	
Johnstown, PA	28,134
FiberVision	
Billings, MT	81,151
GCI	
Anchorage, AK	226,338
Fairbanks, AK	30,843
Galaxy	
Alma, MO	446
Booneville, MS	7,955
Guntown, MS	692
New Albany, MS	6,775
Oxford, MS	9,984
Seneca, KS	2,027
Wilber, NE	1,527
Game Multimedia	
King George's County, VA	13,527
St. Mary's, MD	75,974
Tucson, AZ	405,390
Genesis Cable	
Winder, GA	7,373
Grafton Cable	
Grafton, OH	3,344
H&B Communications	
Holyrood, KS	492
Humble Cable	
Spencer, NY	815
Hunting Cable	
Novato, CA	47,585
Point Reyes, CA	Not Available
Ind-Ca Cable TV	
Mtn. View/Searcy/Pangburn, AR	18,249
Int'l Cable Communications	
Bowling Green, KY	40,641
Covington, KY	43,264
Jeffersonville, IN	21,841
Lafayette, IN	43,764
Lexington-Fayette, KY	225,366

Area and Provider	Population
Insight Communications	
Louisville, KY	269,063
Noblesville, IN	17,655
Knology	
Augusta, GA	44,639
Charleston, SC	80,414
Columbus, GA	178,681
Huntsville, AL	159,789
Knoxville, TN	165,121
Montgomery, AL	4,239
Panama City, FL	34,378
West Point, GA	3,571
Krause Cable	
Seneca, IL	1,878
Lawton Cablevision	
Lawton, OK	80,561
Mallard Cablevision	
Burleson, TX	16,113
River Oaks, TX	6,580
Willow Park, TX	2,328
MediaOne	
Atlanta, GA	394,017
Boston/Boston suburbs (multiple), MA	574,283*
Cleveland, OH	505,616
Detroit/Ann Arbor, MI	1,137,566
Fresno, CA	354,202
Los Angeles, CA	3,485,398
Northeast FL (Jacksonville)	635,230
Orange County, CA	2,410,556
Richmond, VA	203,056
Saint Paul, MN	272,235
Southern FL (Ft. Myers/Naples/Pomp. Beach/Broward County)	1,392,610
Southern MA (Cape Cod/Fall River/New Bedford)	Not Available
Southern NH (Concord/ Nashua/Salem)	Not Available
Stockton, CA	210,943
Western MA (Springfield/Pittsfield)	205,605
Mediacom	
Clearlake Oaks, CA.	2,419
Gulf Breeze/Milton FL	12,746
Huntsville, AL	159,789
Marshall County, KY	27,205
Millsboro, DE	1,643
Mobile, AL	196,278
Sun City, CA.	14,930

Area and Provider	Population
Mid-Coast Cable	
El Campo/Edna, TX	15,854
MidAtlantic	
Howard County, MD	187,328
Prince William, VA	215,686
Rockville, MD	44,835
Multimedia	
Oklahoma City, OK.	444,719
News Press Gazette	
Blythe CA.	8,428
Bullhead City, AZ	21,951
Flagstaff, AZ	45,857
Kingman, AZ	12,722
Lake Havasu, AZ	24,363
Parker, AZ	2,897
Payson, AZ	8,377
Sedona, AZ	7,720
Northland Communications	
Bainbridge Island, WA	Not Available
Starkville, MS	18,458
One Point Communications	
VA communities	Not Available
Orion Cable Systems	
San Marcos, CA	38,974
Pine Tree Cable	
Machias, ME	1,773
Plantation Cablevision	
Greensboro, GA	2,860
Ponderosa Cable	
Danville, CA	31,306
Prestige Cable	
Bartow, GA	292
Canton, GA	4,817
Forsyth County, GA	44,083
Mooreville/Statesville, NC	26,884
Spotsylvania Courthouse, VA	2,694
Westminster, MD	13,068
RCN	
Allentown, PA	105,090
Boston, MA.	574,283
Carmel Hamlet, NY	4,800
Daly City, CA	92,311
Hillsborough, NJ	Not Available
Montgomery County, MD	757,027
New York, NY	7,322,564
Philadelphia, PA	1,585,577
Princeton, NJ	12,016

Area and Provider	Population
RCN	
Somerville/Arlington/Newton/ Waltham, MA	261,303
Washington, DC	606,900
Watertown, MA	33,284
Range TV	
Chisholm/Hibbing, MI	23,336
Mountain Iron, MI	3,362
Nashwauk/Keewatin, MI	2,144
Virginia, MI	9,410
Rankin Cable	
Rankin County, MS	87,161
Rapid	
Branson, MO	3,706
Robson	
Saddlebrooke, AZ	Not Available
Sun Lakes, AZ	6,578
Rogers Cable	
Wasila, AR	Not Available
San Bruno Municipal Cable	
San Bruno, CA	38,961
Satellite Cable Services	
Brookings, SD	16,270
Chamberlain, SD	2,347
Freeman, SD	1,293
Searle Communications	
Monument, CO	1,020
Service Electric	
Allentown, PA	105,090
Bethlehem, PA	71,428
Birdsboro, PA	4,222
Easton, PA	26,276
Emmaus, PA	11,157
Frenchtown, NJ	1,528
Hazleton, PA	24,730
Lafayette, NJ	Not Available
Mahanoy City, PA	5,209
Sunbury, PA	11,591
Wilkes-Barre, PA	47,523
Shen-Heights Cable	
Shenandoah, PA	6,221
Shrewsbury Cable	
Shrewsbury, MA	Not Available
Sjoberg's Cable	
Thief River Falls, MN	8,010
Southwest Missouri Cable	
Carthage, MO	10,747

Area and Provider	Population
Star Cable	
Nelson, OH	Not Available
Strategic Technologies	
Natomas Park, CA	Not Available
Stevenson Ranch, CA	Not Available
Sun Country Cable	
Los Altos, CA	26,303
Spokane, WA	177,196
SunTel	
Lake Alamanor, CA	Not Available
Winnemucca, NV	6,134
Tennessee Cable	
Oak Ridge, TN	27,310
Time Warner	
Akron, OH	223,019
Albany/Saratoga/Troy, NY	180,352
Aroostook County, ME	86,936
Austin, TX	465,622
Bakersfield, CA	174,820
Binghamton, Corning, Elmira, Norwich, NY	106,283
Canton, OH	84,161
Central FL (Brevard, Seminole, Orange City)	413,576
Charlotte, NC	395,934
Cincinnati, OH	364,040
Columbia, SC	98,052
El Paso, TX	515,342
Greensboro, NC	183,521
Houston, TX	1,630,553
Kansas City, MO	435,146
Los Angeles, CA	3,485,398
Memphis, TN	610,337
Minneapolis, MN	368,363
New York City (Manhattan), NY	Not Available
Oahu, HI	836,231
Oneida, NY	10,850
Orange County, CA	2,410,556
Orlando, FL	164,693
Portland, ME	64,358
Rochester, NY	231,636
San Antonio, TX	935,933
San Diego, CA	1,110,549
Syracuse/Oswego/Ithaca, NY	313,678
Tampa, FL	280,015
Western OH	Not Available
Wilmington, NC	55,530
Youngstown, OH	95,732

* Does not include suburbs.

APPENDIX B: RBOC DSL DEPLOYMENT
Availability of DSL Services from RBOCs in the United States

Appendix B is a compilation of the areas where Regional Bell Operating Companies (RBOCs) are currently providing DSL services (marketed under a variety of names, such as Infospeed and Fast Access). DSL services will not necessarily be available to the entire population of the listed city. These data are based on public information provided by the RBOCs (primarily on the Web) in March 2000. The data provided by the various RBOCs differed in their degrees of comprehensiveness. The population data are from the U.S. Census Bureau's 1990 Census Gazetteer, (www.census.gov/cgi-bin/gazetteer).

RBOC	Population
Ameritech	
Ann Arbor (and suburbs), MI	109,592
Bloomington, IL	51,972
Chicago (and suburbs), IL	2,783,726
Cleveland (and suburbs), OH	505,616
Detroit (and suburbs), MI	1,027,974
Elkhart, IN	43,627
Fort Wayne, IN	173,072
Jackson, MI	37,446
Lafayette, IN	43,764
Terre Haute, IN	57,483
Valparaiso, IN	24,414
Wausau, WI	37,060
Bell Atlantic	
Alexandria, VA	111,183
Altoona, PA	51,881
Arlington, VA	170,936
Elizabeth, NJ	110,002
Harrisburg, PA	52,376
Huntington, WV	54,844
Jersey City, NJ	228,537
Lancaster, PA	55,551
New Brunswick, NJ	41,711
New York, NY	7,322,564
Newark, NJ	275,221
Norfolk, VA	261,229
Paterson, NJ	140,891
Philadelphia, PA	1,585,577
Pittsburgh, PA	369,879
Richmond, VA	203,056
Scranton, PA	81,805
Virginia Beach, VA	393,069
Washington, DC	606,900
Wilmington, DE	71,529
Bell South	
Athens, GA	45,734
Atlanta, GA	394,017
Augusta, GA	44,639

RBOC	Population
Bell South	
Baton Rouge, LA	219,531
Birmingham, AL	265,968
Boca Raton, FL	61,492
Charleston, SC	80,414
Charlotte, NC	395,934
Chattanooga, TN	152,466
Columbia, SC	98,052
Daytona Beach, FL	61,921
Durham, NC	136,611
Fort Lauderdale, FL	149,377
Gainesville, FL	84,770
Greensboro, NC	183,521
Greenville, SC	58,282
Hillsborough, FL	Not Available
Huntsville, AL	159,789
Jackson, MS	196,637
Jacksonville, FL	635,230
Knoxville, TN	165,121
Lafayette, LA	94,440
Lexington-Fayette, KY	225,366
Louisville, KY	269,063
Manatee, FL	Not Available
Memphis, TN	610,337
Miami, FL	358,548
Montgomery, AL	187,106
Nashville, TN	Not Available
New Orleans, LA	496,938
Orlando, FL	164,693
Pensacola, FL	58,165
Pinellas, FL	Not Available
Raleigh, NC	207,951
Sarasota, FL	50,961
Tampa, FL	280,015
West Palm Beach, FL	67,643
Winston-Salem, NC	143,485
Nevada Bell	
Carson City, NV	40,443
Reno, NV	133,850
Sparks, NV	53,367
Pacific Bell (all in California)	
Agoura Hills	20,390
Alameda	76,459
Albany	16,327
Alhambra	82,106
Anaheim	266,406
Antioch	62,195
Aptos	9,061

RBOC	Population
Pacific Bell (all in California)	
Arcadia	48,290
Arlington	Not Available
Arroyo Grande	14,378
Atwater	22,282
Auburn	10,592
Bakersfield	174,820
Balboa	Not Available
Benicia	24,437
Berkeley	102,724
Beverly Hills	31,971
Bishop	3,475
Blue Revine	Not Available
Boulder Creek	6,725
Brea	32,873
Brentwood	7,563
Buena Park	68,784
Burbank	93,643
Burlingame	26,801
Calabasas	Not Available
Canoga Park	Not Available
Carlsbad	63,126
Carmel	Not Available
Castaic	Not Available
Chico	40,079
Chula Vista	135,163
Clayton	7,317
Clovis	50,323
Colma	1,103
Colton	40,213
Compton	90,454
Concord	111,348
Corona	76,095
Corona Del Ray	Not Available
Coronado	26,540
Costa Mesa	96,357
Cotati	5,714
Culver City	38,793
Danville	31,306
Davis	46,209
Del Mar	4,860
Edgewood	Not Available
El Cajon	88,693
El Dorado	Not Available
El Monte	106,209
El Segundo	15,223
El Sobrante	9,852

RBOC	Population
Pacific Bell (all in California)	
El Toro	62,685
Encinitas	55,386
Escondido	108,635
Eureka	27,025
Fair Oaks	26,867
Fairfield	77,211
Fallbrook	22,095
Folsom	29,802
Fontana	87,535
Fremont	173,339
Fresno	354,202
Fullerton	114,144
Garden Grove	143,050
Gardena	49,847
Glendale	180,038
Grass Valley	9,048
Half Moon Bay	8,886
Hawthorne	71,349
Hayward	111,498
Hercules	168,29
Highland	34,439
Hollywood	Not Available
Ignacio	Not Available
Imperial Beach	26,512
Inglewood	109,602
Irvine	110,330
La Brea	Not Available
La Crescenta-Montrose	16,968
La Jolla	Not Available
La Mesa	52,931
Lafayette	23,501
Laguna Niguel	44,400
Lakeside	39,412
Larkspur	11,070
Livermore	56,741
Lodi	51,874
Lomita	19,382
Los Altos	26,303
Los Angeles	3,485,398
Martinez	31,808
Menlo Park	28,040
Merced	56,216
Mill Valley	13,038
Millbrae	20,412
Milpitas	50,686
Mission Viejo	72,820

RBOC	Population
Pacific Bell (all in California)	
Modesto	164,730
Monterey	31,954
Moraga Town	15,852
Mountain View	67,460
Napa	61,842
National City	54,249
Nevada City	28,555
Newhall	Not Available
Nimbus	Not Available
North Highlands	42,105
North Hollywood	Not Available
Northridge	Not Available
Oakland	372,242
Oceanside	128,398
Orange	110,658
Orangevale	26,266
Orinda	16,642
Oroville	11,960
Pacific Beach	Not Available
Pacifica	37,670
Palm Springs	40,181
Palmdale	68,842
Palo Alto	55,900
Paramount	47,669
Pasadena	131,591
Pedley	8,869
Petaluma	43,184
Pittsburg	47,564
Placentia	41,259
Placerville	8,355
Pleasanton	50,553
Poway	43,516
Rancho Bernardo	Not Available
Rancho Penasquitos	Not Available
Rancho San Diego	6,977
Rancho Santa Fe	Not Available
Rancho Santa Margarita	11,390
Redding	66,462
Redwood City	66,072
Reseda	Not Available
Rhonert Park	Not Available
Richmond	87,425
Riverside	226,505
Rocklin	19,033
Rosemead	51,638
Sacramento	369,365

RBOC	Population
Pacific Bell (all in California)	
Salinas	108,777
San Bruno	38,961
San Carlos	26,167
San Clemente	41,100
San Diego	1,110,549
San Francisco	723,959
San Gabriel	37,120
San Jose	782,248
San Juan Capistrano	26,183
San Leandro	68,223
San Luis Obispo	41,958
San Marcos	38,974
San Martin	1,713
San Mateo	85,486
San Pedro	Not Available
San Rafael	48,404
San Ramon	35,303
Santa Ana	293,742
Santa Barbara	85,571
Santa Clara	93,613
Santa Cruz	49,040
Santa Margarita	Not Available
Santa Monica	86,905
Santa Rosa	113,313
Santee	52,902
Saugus	Not Available
Sausalito	7,152
Scotts Valley	8,615
Seaside	38,901
Sebastopol	7,004
Sherman Oaks	Not Available
Shingle Springs	2,049
Simi Valley	100,217
Solamint	Not Available
Sonoma	8,121
South Gate	86,284
South Lake Tahoe	21,586
South Pasadena	23,936
Stockton	210,943
Sunnyvale	117,229
Tiburon	7,532
Torrance	133,107
Tracy	33,558
Truckee	3,484
Turlock	42,198
Tustin	50,689

RBOC	Population
Pacific Bell (all in California)	
Ukiah	14,599
Union City	53,762
Vacaville	71,479
Vallejo	109,199
Van Nuys	Not Available
Ventura	Not Available
Visalia	75,636
Vista	71,872
Walnut Creek	60,569
Watsonville	31,099
West Los Angeles	Not Available
Woodland	39,802
Yorba Linda	52,422
Yuba City	27,437
Southwestern Bell	
Abilene, TX	106,654
Addicks, TX	Not Available
Addison, TX	8,783
Alvin, TX	19,220
Amarillo, TX	157,615
Arlington, TX	261,721
Arnold, MO	18,828
Austin, TX	465,622
Beaumont, TX	114,323
Belton, MO	18,150
Bentonville, AR	11,257
Blue Springs, MO	40,153
Brideton, MO	Not Available
Carrollton, TX	82,169
Cedar Hill, TX	19,976
Cedar Valley, TX	Not Available
Chesterfield, MO	37,991
Cleburne, TX	22,205
Clute, TX	8,910
College Station, TX	52,456
Columbia, MO	69,101
Coppell, TX	16,881
Corpus Christi, TX	257,453
Creve Coeur, MO	12,304
Cypress, TX	Not Available
Dallas, TX	1,006,877
Denton, TX	66,270
DeSoto, TX	30,544
Duncanville, TX	35,748
Edmond, OK	52,315
El Paso, TX	515,342
Enid, OK	45,309

RBOC	Population
Southern Bell	
Farmers Branch, TX	24,250
Fayetteville, AR	42,099
Fenton, MO	3,346
Ferguson, MO	22,286
Florissant, MO	51,206
Flower Mound, TX	15,527
Fort Smith, AR	72,798
Fort Worth, TX	447,619
Friendswood, TX	22,814
Frisco, TX	6,141
Garland, TX	180,650
Gladstone, MO	26,243
Grand Prairie, TX	99,616
Harvester, MO	Not Available
Hays, KS	17,767
Hazelwood, MO	15,324
High Ridge, MO	4,423
Houston, TX	1,630,553
Hutchinson, KS	39,308
Incline Village-Crystal Bay, NV	7,119
Independence, MO	112,301
Irving, TX	155,037
Kansas City, KS	149,767
Kansas City, MO	435,146
Kirkwood, MO	27,291
Klien, TX	Not Available
La Porte, TX	27,910
Ladue, MO	8,847
Lake Jackson, TX	22,776
Lancaster, TX	22,117
Las Colinas, TX	Not Available
Lawrence, KS	65,608
Lawton, OK	80,561
Lee's Summit, MO	46,418
Lenexa, KS	34,034
Leon Springs, TX	Not Available
Lewisville, TX	46,521
Liberty, MO	20,459
Little Rock, AR	175,795
Lubbock, TX	186,206
Manchester, MO	6,542
Manhattan, KS	37,712
Mehlville, MO	27,557
Mesquite, TX	101,484
Midland, TX	89,443
Mission, KS	9,504

RBOC	Population
Southwestern Bell	
Mount Pleasant, TX	12,291
Nederland, TX	16,192
New Braunfels, TX	27,334
Norman, OK	80,071
Oakville, MO	31,750
Odessa, TX	89,699
Oklahoma City, OK	444,719
Olathe, KS	63,352
Overland Park, KS	111,790
Overland, MO	17,987
Parkville, MO	2,402
Pearland, TX	18,697
Pflugerville, TX	4,444
Plano, TX	128,713
Richardson, TX	74,840
Richland Hills, TX	7,978
Rogers, AR	24,692
Rosenberg, TX	20,183
Round Rock, TX	30,923
Salina, KS	42,303
San Angelo, TX	84,474
San Antonio, TX	935,933
Seguin, TX	18,853
Shawnee, KS	37,993
Spanish Lake, MO	20,322
Spring, TX	33,111
Springdale, AR	29,941
St. Charles, MO	54,555
St. Joseph, MO	71,852
St. Louis, MO	396,685
Stanley, KS	Not Available
Stillwater, OK	36,676
Temple, TX	46,109
Texarkana, TX	31,656
Tomball, TX	6,370
Topeka, KS	119,883
Tulsa, OK	367,302
Universal City, TX	13,057
Valley Park, MO	4,165
Waco, TX	103,590
Webster Groves, MO	22,987
Wichita, KS	304,011

RBOC	Population
US West	
Albany, OR	29,462
American Fork, UT	15,696
Ames, IA	47,198
Ankeny, IA	18,482
Anoka, MN	17,192
Arvada, CO	89,235
Auburn, WA	33,102
Aurora, CO	222,103
Bainbridge Island, WA	Not Available
Beardsley, AZ	Not Available
Beaverton, OR	53,310
Bellevue, WA	86,874
Bellingham, WA	52,179
Bethany, AZ	Not Available
Bettendorf, IA	28,132
Bismarck, ND	49,256
Blaine, MN	38,975
Bloomington, MN	86,335
Boise City, ID	125,738
Boulder, CO	83,312
Bountiful, UT	36,659
Bremerton, WA	38,142
Brooklyn Center, MN	28,887
Broomfield, CO	24,638
Burnsville, MN	51,288
Castle Rock, CO	8,708
Catalina, AZ	4,864
Cedar Rapids, IA	108,751
Chandler, AZ	90,533
Cheyenne, WY	50,008
Clearfield, UT	21,435
Colorado Springs, CO	281,140
Coon Rapids, MN	52,978
Cortaro, AZ	Not Available
Corvallis, OR	44,757
Cottage grove, MN	22,935
Council Bluffs, IA	54,315
Craycroft, AZ	Not Available
Crystal, MN	23,788
Davenport, IA	95,333
Deer Valley, AZ	Not Available
Denver, CO	467,610
Des Moines, IA	193,187

RBOC	Population
US West	
Des Moines, WA	17,283
Draper, UT	7,257
Duluth, MN	85,493
Eagan, MN	47,409
Eagle, ID	3,327
Eden, MN	Not Available
Eden Prairie, MN	39,311
Englewood, CO	29,387
Eugene, OR	112,669
Everett, WA	69,961
Excelsior, MN	2,367
Fargo, ND	74,111
Farmington, UT	9,028
Federal Way, WA	67,554
Flagstaff, AZ	45,857
Flowing Wells, AZ	14,013
Foothills, AZ	Not Available
Fort Collins, CO	87,758
Fort McDowell, AZ	Not Available
Fridley, MN	28,335
Ft Snelling, MN	Not Available
Glendale, AZ	148,134
Golden Valley, MN	20,971
Grand Forks, ND	49,425
Grand Junction, CO	29,034
Greeley, CO	60,536
Helena, MT	24,569
Highlands Ranch, CO	10,181
Holiday, UT	Not Available
Hopkins, MN	16,534
Idaho Falls, ID	43,929
Iowa City, IA	59,738
Issaquah, WA	7,786
Kaysville, UT	13,961
Kearns, UT	28,374
Kennewick, WA	42,155
Kent, WA	37,960
Lacey, WA	19,279
Lake Oswego, OR	30,576
Lakewood, CO	126,481
Lehi, UT	8,475
Litchfield Park, AZ	3,303
Littleton, CO	33,685
Longmont, CO	51,555
Maplewood, MN	30,954

RBOC	Population
US West	
Maryvale, AZ	Not Available
Mercer Island, WA	20,816
Meridian, ID	9,596
Mesa, AZ	288,091
Midrivers, AZ	Not Available
Midvale, UT	11,886
Milwaukie, OR	18,692
Minneapolis, MN	368,383
Murray, UT	31,282
Muscatine, IA	22,881
Nampa, ID	28,365
New Brighton, MN	22,207
North St. Paul, MN	12,376
Northglenn, CO	27,195
Olympia, WA	33,840
Omaha, NE	335,795
Oregon City, OR	14,698
Orem, UT	67,561
Pecos, AZ	Not Available
Peoria, AZ	50,618
Phoenix, AZ	983,403
Pineacle Peak, AZ	Not Available
Pleasant Grove, UT	13,476
Plymouth, MN	50,889
Pocatello, ID	46,080
Portland, OR	437,319
Prairie, MN	Not Available
Prescott, AZ	26,455
Provo, UT	86,835
Pueblo, CO	98,640
Puyallup, WA	23,875
Rapid City, SD	54,523
Redmond, WA	35,800
Renton, WA	41,688
Richfield, MN	35,710
Rincon, AZ	Not Available
Rochester, MN	70,745
Salem, OR	107,786
Salt Lake City, UT	159,936
Scottsdale, AZ	130,069
Seattle, WA	516,259
Shoreview, MN	24,587
Sioux Falls, SD	100,814
Smokey Hill, CO	Not Available
Spokane, WA	177,196
Springfield, OR	44,683

RBOC	Population
US West	
Springville, UT	13,950
St. Cloud, MN	48,812
St. Paul, MN	272,235
Sunnyslope, AZ	Not Available
Sunrise, AZ	Not Available
Superstition, AZ	Not Available
Tacoma, WA	176,664
Tanque Verde, AZ	Not Available
Tempe, AZ	141,865
Tolleson, AZ	4,434
Tucson, AZ	405,390
Twin Falls, ID	27,591
Vail, CO	3,659
Vancouver, WA	46,380
Wayzata, MN	3,806
West Fargo, ND	12,287
West St. Paul, MN	19,248
Westminster, CO	74,625
White Bear Lake, MN	24,704

APPENDIX C
Characteristics of a Sample of Existing and Proposed Satellite and High Altitude Systems

1. Aster

Key Investors:

Number of Satellites Planned: 5 GEO

Coverage: worldwide

Uplink Data Rate (channel freq.): up to 622 Mbps (35.0 to 51.4 GHz)

Downlink Data Rate (channel freq.): up to 16 Mbps (35.0 to 51.4 GHz)

Estimated Aggregate Bandwidth: N/A

Estimated Subscriber Cost: competitive with terrestrial

First Satellite in Service: 2002

Full Constellation in Service: N/A

2. Astrolink

Key Investors: Lockheed Martin, TRW, Telespazio, Liberty Media

Number of Satellites Planned: 9 GEO

Coverage: worldwide

Uplink Data Rate (channel freq.): up to 20 Mbps (Ka band)

Downlink Data Rate (channel freq.): up to 920 Mbps (Ka band)

Estimated Aggregate Bandwidth: 6.5 Gbps per satellite

Estimated Subscriber Cost: competitive with terrestrial

First Satellite in Service: by 2001

Full Constellation in Service: market dependent

3. Celestri

Key Investors: Motorola, Matra, Marconi

Number of Satellites Planned: 63 LEO + 9 GEO

Coverage: worldwide

Uplink Data Rate (channel freq.): up to 51 Mbps (Ka band)

Downlink Data Rate (channel freq.): up to 51 Mbps (Ka band)

Estimated Aggregate Bandwidth: 80 Gbps system capability

Estimated Subscriber Cost: competitive with terrestrial

Full Constellation in Service: 2003

4. COMSAT World Systems

Key Investors: 142 member INTELSAT

Number of Satellites Planned: 25 GEO

Coverage: worldwide

Uplink Data Rate (channel freq.): up to 155 Mbps

Downlink Data Rate (channel freq.): up to 1 Gbps

Estimated Aggregate Bandwidth: 50 Gbps

Estimated Subscriber Cost: N/A (market is presently telecomm companies)

First Satellite in Service: fully operational

Full Constellation in Service: fully operational

5. GE*Star

Key Investors: GE Americon

Number of Satellites Planned: 9 GEO

Coverage: worldwide

Uplink Data Rate (channel freq.): presently 33 kbps (14.0-14.5 GHz)

Downlink Data Rate (channel freq.): presently 2 Mbps (11.7-12.2 GHz)

Estimated Aggregate Bandwidth: N/A

Estimated Subscriber Cost: \$30 to \$130 per month (\$200+ installation cost)

First Satellite in Service: fully operational (GE-3 87° west)

Full Constellation in Service: 2003

6. Halo

Key Investors: numerous

Number of Satellites Planned: high altitude long operation (HALO) aircraft

Coverage: 1+ platform per metropolitan area

Uplink Data Rate (channel freq.): up to 25 Mbps (27.5 to 27.8 GHz)

Downlink Data Rate (channel freq.): up to 25 Mbps (28.1 to 28.4 GHz)

Estimated Aggregate Bandwidth: N/A

Estimated Subscriber Cost: 1 Mbps \$50 per month, 10 Mbps \$250 per month

First Satellite in Service: 2000 to 2001 planned

Full Constellation in Service: 100 cities by 2003

7. Hughes DirecPC

Key Investors: Hughes Network Systems

Number of Satellites Planned: leased GEO

Coverage: North America

Uplink Data Rate (channel freq.): standard telephone modem

Downlink Data Rate (channel freq.): 400 kbps (4 GHz)

Estimated Aggregate Bandwidth: N/A

Estimated Subscriber Cost: \$30 to \$130 per month (200+ installation cost)

First Satellite in Service: fully operational (Galaxy IV 99° west)

Full Constellation in Service: N/A

8. iSky

Key Investors: Liberty Media, TV Guide, Kleiner Perkins

Number of Satellites Planned: 2 GEO (109.2° west)

Coverage: North America

Uplink Data Rate (channel freq.): N/A

Downlink Data Rate (channel freq.): N/A

Estimated Aggregate Bandwidth: N/A

Estimated Subscriber Cost: competitive with DSL/cable, \$40 per month

First Satellite in Service: end 2001 (GEO 109.2° west)

Full Constellation in Service: N/A

9. Leo One

Key Investors: Leo One

Number of Satellites Planned: 48 LEO (6 x 8 orbital planes)

Coverage: worldwide

Uplink Data Rate (channel freq.): 9.6 kbps (148 to 150 MHz)

Downlink Data Rate (channel freq.): 24 kbps (137 to 138 MHz, 400-401 MHz)

Estimated Aggregate Bandwidth: 50 kbps per gateway

Estimated Subscriber Cost: N/A

First Satellite in Service: N/A

Full Constellation in Service: mid 2003

10. Orblink

Key Investors:

Number of Satellites Planned: 7 MEO

Coverage: worldwide

Uplink Data Rate (channel freq.): up to 1.5 Mbps (47.7 to 48.7 GHz)

Downlink Data Rate (channel freq.): up to 1.25 Gbps (37.5 to 38.5 GHz)

Estimated Aggregate Bandwidth: N/A

Estimated Subscriber Cost: competitive with terrestrial

First Satellite in Service: 2002

Full Constellation in Service: 2002

11. Orion

Key Investors: Orion Network Systems

Number of Satellites Planned: 3 GEO

Coverage: most of the world

Uplink Data Rate (channel freq.): up to 25 Mbps

Downlink Data Rate (channel freq.): up to 25 Gbps

Estimated Aggregate Bandwidth: N/A

Estimated Subscriber Cost: competitive with terrestrial

First Satellite in Service: Orion 1 fully operational

Full Constellation in Service: as per market demand

12. Pentriad

Key Investors: Denali Telecomm

Number of Satellites Planned: 13 quasi-GEO (high elliptical)

Coverage: Northern Hemisphere

Uplink Data Rate (channel freq.):

Downlink Data Rate (channel freq.): 45 to 155 Mbps

Estimated Aggregate Bandwidth: 144 Gbps

Estimated Subscriber Cost: N/A

First Satellite in Service: N/A

Full Constellation in Service: N/A

- 13. SkyBridge**
Key Investors: Alcatel Alsthom, Toshiba, Mitsubishi Electric, Aerospace Canada
Number of Satellites Planned: 80 LEO
Coverage: worldwide
Uplink Data Rate (channel freq.): 2 to 10 Mbps (10 to 18 GHz)
Downlink Data Rate (channel freq.): 20 to 100 Mbps (10 to 18 GHz)
Estimated Aggregate Bandwidth: 215 Gbps
Estimated Subscriber Cost: N/A
First Satellite in Service: beginning 2002
Full Constellation in Service: beginning 2002
- 14. Sky Station**
Key Investors: Sky Station
Number of Satellites Planned: lighter than air platforms
Coverage: 1+ platform per metropolitan area
Uplink Data Rate (channel freq.): up to 10 Mbps (47.9 to 48.2 GHz)
Downlink Data Rate (channel freq.): up to 10 Mbps (47.2 to 47.5 GHz)
Estimated Aggregate Bandwidth: N/A
Estimated Subscriber Cost: competitive with terrestrial
First Satellite in Service: 2002
Full Constellation in Service: depends on market demand
- 15. Spaceway**
Key Investors: Hughes Electronics
Number of Satellites Planned: 16 GEO + 20 MEO (8 GEO initial system)
Coverage: worldwide
Uplink Data Rate (channel freq.): up to 6 Mbps (27.5 to 30.0 GHz)
Downlink Data Rate (channel freq.): up to 108 Mbps shared (17.7 to 20.0 GHz)
Estimated Aggregate Bandwidth: 35.2 (8 GEO initial system)
Estimated Subscriber Cost: competitive with terrestrial
First Satellite in Service: 2002 (1 to 4 GEO)
Full Constellation in Service: as per market demand
- 16. Teledesic**
Key Investors: Craig McCaw, Bill Gates, Boeing
Number of Satellites Planned: 288 LEO + 24 spare LEO
Coverage: worldwide
Uplink Data Rate (channel freq.): up to 2 Mbps (28.6 to 29.1 GHz)
Downlink Data Rate (channel freq.): up to 64 Mbps (18.8 to 19.3 GHz)
Estimated Aggregate Bandwidth: 144 Gbps
Estimated Subscriber Cost: competitive with terrestrial
First Satellite in Service: 2002 (288 LEO)
Full Constellation in Service: 2004

17. TRW Global EHS Satellite Network

Key Investors: TRW

Number of Satellites Planned: 4 GEO + 15 MEO

Coverage:

Uplink Data Rate (channel freq.): N/A

Downlink Data Rate (channel freq.): N/A

Estimated Aggregate Bandwidth: 1.3 Tbps

Estimated Subscriber Cost: N/A

First Satellite in Service: 48 months after FCC license (GEO)

Full Constellation in Service: 6 years after FCC license

18. Virtual GEO/Virgo

Key Investors: Virtual GEO

Number of Satellites Planned: 15 quasi-GEO (high elliptical)

Coverage: worldwide

Uplink Data Rate (channel freq.): (14.0 to 14.5 GHz)

Downlink Data Rate (channel freq.): (11.2 to 12.7 GHz)

Estimated Aggregate Bandwidth: N/A

Estimated Subscriber Cost: N/A

First Satellite in Service: 2003

Full Constellation in Service: 2003

United States Senate

WASHINGTON, DC 20510

May 20, 1999

The Honorable Larry Irving
Administrator
The National Telecommunications and Information Administration
U.S. Department of Commerce
14th Street & Constitution Avenue, NW
Washington, D.C. 20230

The Honorable Wally Beyer
Administrator
The Rural Utility Service
U.S. Department of Agriculture
14th Street & Independence Avenue, SW
Washington, D.C. 20250

Dear Mr. Irving and Mr. Beyer:

We are writing to ask the National Telecommunications and Information Administration (NTIA) and the Rural Utility Service (RUS) to conduct a joint assessment of the availability of advanced telecommunications capability to all Americans, with a particular focus on rural and high cost areas, and provide us with recommendations to ensure ubiquitous deployment of advanced telecommunications capability to all Americans particularly in rural areas. This study should assess:

- (1) the investment in telecommunications facilities with advanced capability in rural areas compared with non-rural areas, including an assessment of the various levels of capability being deployed under different technologies and the bandwidth capabilities of such deployment and whether or not comparable bandwidth is being deployed consistent with the objectives under Sec. 254(b)(2) and (3) of the Communications Act and Sec. 706 of the Telecommunications Act;
- (2) the availability of telecommunications backbone networks and "last mile" facilities with advanced capability in rural areas compared with advanced telecommunications backbone networks and last mile facilities in non-rural areas;
- (3) the capability of various technological enhancements to existing wireline and wireless networks to provide last mile advanced telecommunications capability in rural areas;

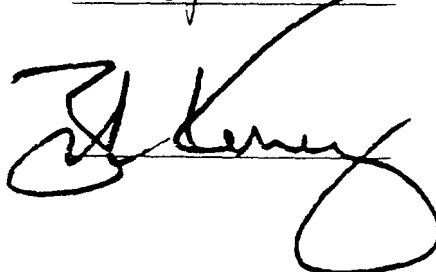
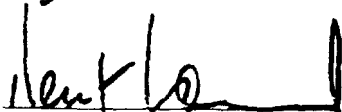
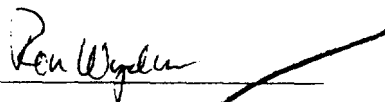
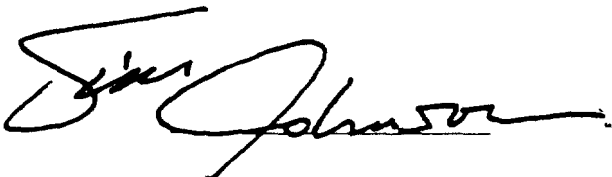
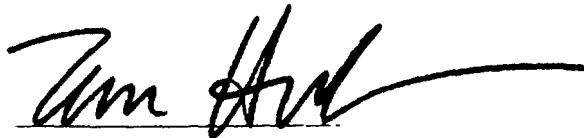
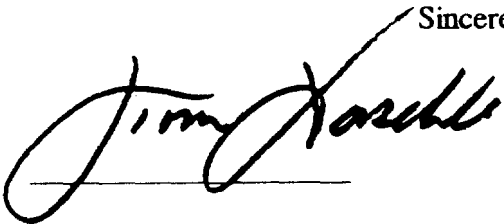
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- (4) the feasibility of various technological alternatives to provide last mile advanced telecommunications capability in rural areas;
- (5) the rate of deployment of advanced telecommunications capability in rural areas compared with the deployment of such capability in non-rural areas and identify specific geographic areas where advanced telecommunications capability is being deployed at a significantly lower rate than such services are being deployed elsewhere in the Nation; and
- (6) the effectiveness of competition and universal service support mechanisms to promote the deployment of advanced telecommunications capability and the availability of advanced telecommunications services in rural areas.

If your assessment finds that deployment of advanced telecommunications capability and services is not occurring in rural areas at a reasonably comparable pace as in non-rural areas, we would appreciate any recommendations, either legislative and non-legislative (including regulatory) that could improve deployment of advanced telecommunications capability and the availability of advanced telecommunications services in rural areas.

We look forward to working with you on this important project

Sincerely,



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May 20, 1999

Pati Weibel

Max Baucus

Patty Murray

Byron L. Morgan

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